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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/863,150	05/23/2001	Mark Leonard O'Neill	06150 USA	1068

23543 7590 01/02/2003

AIR PRODUCTS AND CHEMICALS, INC.  
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EXAMINER

MEEKS, TIMOTHY HOWARD

ART UNIT	PAPER NUMBER
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1762

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DATE MAILED: 01/02/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/863,150

Applicant(s)

O'NEILL ET AL.

Examiner

Timothy H. Meeks

Art Unit

1762

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-75 is/are pending in the application.
- 4a) Of the above claim(s) 1-17,70 and 71 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 18-69 and 72-75 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☒ Claim(s) 1-75 are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2,3. 6) ☐ Other:

**DETAILED ACTION**

***Election/Restrictions***

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-17 and 70-71, drawn to a film, classified in class 428, subclass 426.
- II. Claims 18-69 and 72-75, drawn to a method, classified in class 427, subclass 248.1.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the film could be made by a sputtering process instead of CVD.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

During a telephone conversation with Geoffrey Chase on September 23, 2002 a provisional election was made with traverse to prosecute the invention of Group II, claims 18-69 and 72-75. Affirmation of this election must be made by applicant in replying to this Office action. Claims 1-17 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the

Art Unit: 1762

currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

### ***Claim Objections***

Claims 18, 47, and 57 are objected to because of the following informalities: Claim 18 depends from claim 1 which is withdrawn from consideration. It is requested that claim 18 be written in independent form so as to void any possible delays in prosecution. In claim 47, it is requested that "OSG" be written out so as to avoid any possible confusion as to its meaning. In claim 57, line 2, the word "a" should be deleted. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 27, 28, 47, and 73-75 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 27 and 28, how can the "organosilane" be an "organosiloxane"? These are two distinct species.

In claim 47, it is not clear what "mechanical properties" are referred to and what constitutes "superior" as superior is relative to an intended application.

In claims 73-75, what is the improvement from? What is the starting point?

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

Claims 72-75 are rejected under 35 U.S.C. 102(e) as being anticipated by Rose et al.

(6,068,884).

Rose discloses a process comprising providing an organosilicate glass film from chemical vapor deposition of an organosilane or organosiloxane wherein  $\text{NF}_3$  or  $\text{SiF}_4$  are added to the plasma to form fluorine-doped films (col. 5, lines 49-68 and col. 6, lines 40-44). As the film of Rose is formed in the same manner disclosed and claimed by applicants, the films will inherently have the same properties and inherently possess the improved properties of claims 73-75.

Claims 72-75 are rejected under 35 U.S.C. 102(e) as being anticipated by Matsuki (6,410,463).

The claimed process is disclosed at Example 2 in Table 1. As the film of Matsuki is formed in the same manner disclosed and claimed by applicants, the films will inherently have the same properties and inherently possess the improved properties of claims 73-75.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 18-21, 25, 26, 29, 30, 36, 39-47, 53-66, and 72-75 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grill et al. (6,147,009).

Grill et al. disclose a process for forming an organosilica glass film having about 5 to about 40% Si, about 5 to about 45% C, about 0 to about 50% O, and about 10 to about 55% H, and optionally containing F to modify the low-k film properties (col. 6, lines 25-45, col. 7, lines 1-5), comprising introducing an organosilane or organosiloxane precursor, oxygen-containing gas, and a fluorine-containing gas to a plasma CVD chamber and forming a plasma of the gas to form the film (col. 3, lines 15-30, col. 7, lines 1-5). Use of plasma power densities, flow rates, and pressures and film thicknesses and dielectric constants in the claimed ranges are disclosed at col. 3, lines 30-40 and the examples. Use of the claimed plasma power sources is disclosed at col. 3, lines 1-15. Use of the layer as an ILD material is disclosed at col. 3, lines 55-60. Use of a carrier gas of He or Ar is disclosed at col. 5, lines 40-45. Performance of an after-deposition stabilization anneal is disclosed in the examples which constitutes the claimed thermal post-treatment. The claimed precursors are disclosed at col. 3, lines 15-30 and the examples.

The ranges of amounts of Si, C, O, and H in the film of Grill overlap the claimed ranges. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected the overlapping portion of the range disclosed by the reference

Art Unit: 1762

because overlapping ranges have been held to be a prima facie case of obviousness, see *In re Malagari*, 182 USPQ 549.

Grill is silent as to the amount of fluorine to include in the film, however, discloses that it is added to modify the low-k film properties, fluorine addition generally being known to lower dielectric constants of silicon oxide films (see for example, col. 2, lines 1-10 of USP 5,827,785, cited by applicants). Therefore, the amount of fluorine added to the film is a result effective parameter affecting the low-k film properties such as lowering dielectric constant, it would have been obvious to adjust the amount of fluorine in the film through routine experimentation to values in the claimed range to optimize the properties of the film.

Claims 22-24, 27, 28, 31-35, 37, 38, 68, and 69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grill et al. in view of Rose et al.

Grill does not disclose the particular fluorine precursors of these claims. However, because Rose discloses that the claimed precursors are effective for fluorine-doping OSG films (col. 6, lines 40-50), it would have been obvious to use the claimed fluorine compounds with the reasonable expectation of their being effective for adding the fluorine to the films.

Claims 48-52 and 67 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grill in view of Rose as applied above, and further in view of Lee et al. ("Recent Progress in PECVD Low-k Dielectrics...." article cited by applicants).

The claimed densities or pore sizes or addition of a porogen to add porosity is not explicitly disclosed by Grill. However, because Lee et al. disclose that addition of porogens to

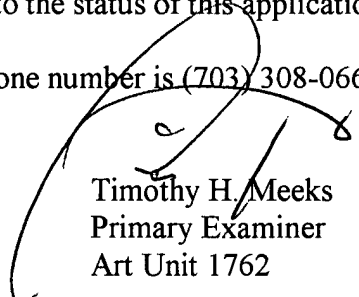
Art Unit: 1762

OSG films with subsequent annealing to burn out the porogens provides porosity to the films and lowers their dielectric constant (2<sup>nd</sup> column) it would have been obvious to add porogens to provide more porous, and hence, less dense, films so as to lower dielectric constants of the films. The claimed pore sizes and densities would have been derived through routine experimentation to optimize the dielectric constants of the films.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy H. Meeks whose telephone number is (703) 308-3816. The examiner can normally be reached on Mon, Tue, and Thu, 6:00-6:30, and Sun, 6-10 am.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive P. Beck can be reached on (703) 308-2333. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



Timothy H. Meeks  
Primary Examiner  
Art Unit 1762

nf  
December 30, 2002